

CLAIMS

THAT CLAIMED IS:

1. A subsea wellhead assembly, comprising:
 - a tubular wellhead member;
 - a production port extending through a side of the wellhead member for transmitting production fluid from the subsea well;
 - a tubing hanger, having a string of tubing extending to a production depth within the subsea well, that lands in a bore of the wellhead member and has an inner bore in fluid communication with the string of tubing;
 - at least one hanger port extending through a side of the tubing hanger for transmitting the production fluid from the bore of the tubing hanger to the production port; and
 - a diverter positioned adjacent the tubing hanger for diverting the flow of production fluid from the hanger port around a portion of the tubing hanger to the production port.
2. The subsea wellhead assembly of claim 1, wherein said at least one hanger port comprises a plurality of hanger ports.
3. The subsea wellhead assembly of claim 1, wherein the hanger port extends through a portion of the tubing hanger at an axial position substantially the same as the production port.
4. The subsea wellhead assembly of claim 1, wherein the diverter has a tubular cross-section and surrounds a portion of the outer surface of the tubing hanger.

5. The subsea wellhead assembly of claim 4, further comprising a diverter port that is located at a substantially opposite circumferential position from the hanger port.
6. The subsea wellhead assembly of claim 5, wherein the diverter port extends through a portion of the diverter at an axial position substantially the same as the production port.
7. The subsea wellhead assembly of claim 1, further comprising a tubing annulus passage extending axially through the tubing hanger.
8. A subsea wellhead assembly, comprising:
 - a tubular wellhead member;
 - a production port extending through a side of the wellhead member for transmitting production fluid from the subsea well;
 - a tubing hanger, having a string of tubing extending to a production depth within the subsea well, that lands in a bore of the wellhead member and has an inner bore in fluid communication with the string of tubing;
 - at least one hanger port extending through a side of the tubing hanger for transmitting production fluid from the bore of the tubing hanger to the production port;
 - a diverter positioned adjacent the hanger port for diverting the flow of production fluid from the hanger port; and
 - at least one diverter port spaced circumferentially from the hanger port for transmitting the production fluid from the hanger port to an outer surface of the diverter, the diverter port being spaced radially outward from the hanger port and radially inward from the production port.

9. The subsea wellhead assembly of claim 8, wherein said at least one hanger port comprises a plurality of hanger ports.
10. The subsea wellhead assembly of claim 8, wherein the hanger port extends through a portion of the tubing hanger at an axial position substantially the same as the production port.
11. The subsea wellhead assembly of claim 8, wherein the diverter has a tubular cross-section and surrounds a portion of the outer surface of the tubing hanger, and wherein the wellhead assembly further comprises upper and lower seals between the diverter and the wellhead member above and below the diverter port.
12. The subsea wellhead assembly of claim 8, wherein said at least one diverter port comprises a plurality of diverter ports.
13. The subsea wellhead assembly of claim 8, wherein the diverter port is extends through a portion a substantially opposite circumferential position from the hanger port so that the production fluid flows around substantially half the circumference of the tubing hanger.
14. The subsea wellhead assembly of claim 8, wherein the hanger port defines a hanger port cross-sectional area, and the bore of the tubing hanger defines a tubing hanger cross-sectional area, and wherein the hanger port cross-sectional area is greater than the tubing hanger cross-sectional area so that a velocity of the production fluid decreases while passing through hanger port.

15. The subsea wellhead assembly of claim 8, wherein the hanger port defines a hanger port cross-sectional area, and the diverter port defines a diverter cross-sectional area, and wherein the diverter cross-sectional area is greater than the hanger port cross-sectional area so that a velocity of the production fluid decreases while passing through diverter port.

16. The subsea well assembly of claim 8, further comprising an annular recess on an outer diameter of the tubing hanger, the hanger port being located in the recess; and

an annular recess in the bore of the wellhead member, the production port being located in the annular recess of the wellhead member.

17. A tubing hanger assembly for a subsea well, comprising:

a tubing hanger member adapted to land in a bore of a wellhead member of a subsea well and adapted to have a string of tubing extend to a production depth within the subsea well;

at least one hanger port extending through a side of the tubing hanger member for transmitting production fluid from a bore of the tubing hanger member to an outer surface of the tubing hanger member;

a diverter cage positioned around the tubing hanger at the hanger port, the diverter cage having an inner diameter greater than an outer diameter of the tubing hanger at the hanger port, defining an annular chamber, causing well fluid to flow into the annular chamber; and

at least one diverter port spaced circumferentially from the hanger port for transmitting the production fluid from the annular chamber to an outer surface of the diverter.

18. The subsea wellhead assembly of claim 17, wherein said at least one hanger comprises a plurality of hanger ports.

19. A method for conveying production fluid from a subsea well, comprising:

landing a tubing hanger member, with a string of tubing extending therefrom, within a bore of a wellhead member of a subsea wellhead, and providing the tubing hanger member with a hanger port extending through its side and with a diverter located adjacent the port and surrounding a portion of the outer surface of the tubing hanger member, the diverter having a diverter port spaced circumferentially from the hanger port;

transmitting a production fluid from the subsea well from the bore of the tubing hanger member through the hanger port to the outer surface of the tubing hanger member;

with the diverter, diverting the production fluid around the portion of the outer surface of the tubing hanger member; and then

transmitting the production fluid through the diverter port to the interior surface of the wellhead member for conveyance from the wellhead member.

20. The method of claim 19, further comprising reducing a velocity of the production fluid while transmitting the production fluid out the tubing hanger port of the tubing hanger member.

21. The method of claim 19, further comprising reducing a velocity of the production fluid while transmitting the production fluid through the diverter port to the interior surface of the wellhead member.